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UNITED STATES PATENT APPLICATION

of

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For a

TOILET VENTILATION SYSTEM AND METHOD

TO THE COMMISSIONER OF PATENTS AND TRADEMARKS:

Your petitioner, **Kirk M. Thomas**, a citizen of the United States and resident of Alaska, prays that letters patent may be granted to him as the inventor of a **TOILET VENTILATION SYSTEM AND METHOD** as set forth in the following specification.

TOILET VENTILATION SYSTEM AND METHOD

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to systems for ventilating toilet odors.

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Related Art

Toilet odors can be a great bother and nuisance. A home or other building that is kept to very high standards of cleanliness can still smell foul due to toilet odors. Unfortunately, typical bathroom exhaust fans are only minimally effective at removing these odors. This 10 may be because such fans pump a relatively small volume of air, and are typically located in a bathroom ceiling, substantially removed from the source of the odors. The long distance and small flow rate of air through the fan mean that a relatively long time is needed for bathroom exhaust fans to have a significant effect. During this time, the odors can easily drift into other parts of the building. Moreover, some bathroom fans are not actually connected to 15 an external exhaust outlet. Such fans merely stir the air in the room, and have very little effect in eliminating odors.

To provide better ventilation, a number of toilet ventilation systems have been developed. Unfortunately, many prior systems have a number of drawbacks. Many of them are quite complicated, with complex piping schemes, pumps, filters, drains, etc. Some of 20 these systems draw odors through conduits in the toilet tank, while others require a specially designed toilet seat with vent inlets. Other systems attempt to mask odors with deodorants, filters, and the like. These and other systems include components that must be replaced on a regular basis, creating a maintenance headache.

25 SUMMARY OF THE INVENTION

It has been recognized that it would be advantageous to develop a toilet ventilation system that is simple and inexpensive, and does not require significant maintenance, and that effectively draws odors away from a bathroom toilet.

In one aspect, the invention provides a flush toilet, including a toilet bowl portion 30 including a perimeter wall enclosing an interior of the bowl. A bowl vent inlet extends through a side of the perimeter wall from the interior to the exterior of the bowl at a position above a static water level in the bowl. The bowl vent inlet has an exterior end configured to connect to a vent conduit.

In accordance with another aspect thereof, the invention provides a toilet ventilation system for a toilet in a building. The system includes an air vent pipe, and a fan. The air vent pipe extends through a wall of a toilet bowl of the toilet and connects to a vent pipe outlet extending outside the building. The fan is configured to draw air from the toilet bowl through the air vent pipe, and to discharge the air through the vent pipe outlet.

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In accordance with yet another aspect thereof, the invention provides method for ventilating a flush toilet having a toilet bowl. The method includes the steps of providing a toilet bowl inlet in an interior of the toilet bowl, connecting the toilet bowl inlet to a vent conduit, and drawing air from the interior of the toilet bowl through the vent conduit to a 10 discharge location outside of a building where the toilet is located.

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Additional features and advantages of the invention will be apparent from the detailed description which follows, taken in conjunction with the accompanying drawings, which together illustrate, by way of example, features of the invention.

15 **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a perspective view of one embodiment of a toilet configured to be connected to a ventilation system in accordance with the present invention.

FIG. 2 is an elevation view of one embodiment of a toilet ventilation system according to the present invention.

20 FIG. 3 is an elevation view of an alternative toilet ventilation system according to the present invention.

FIG. 4 is an elevation view of another alternative toilet ventilation system according to the present invention.

25 FIG. 5 is an elevation view of yet another alternative embodiment of a toilet ventilation system according to the present invention.

FIG. 6a is a cross-sectional view of one embodiment of the sidewall of the toilet bowl of FIG. 1, wherein the vent inlet is integrally formed with the toilet bowl.

30 FIG. 6b is a cross-sectional view of another embodiment of the sidewall of the toilet bowl of FIG. 1 wherein the vent inlet comprises an insert extending through an aperture in the toilet bowl.

DETAILED DESCRIPTION

Reference will now be made to the exemplary embodiments illustrated in the drawings, and specific language will be used herein to describe the same. It will nevertheless

be understood that no limitation of the scope of the invention is thereby intended. Alterations and further modifications of the inventive features illustrated herein, and additional applications of the principles of the inventions as illustrated herein, which would occur to one skilled in the relevant art and having possession of this disclosure, are to be considered within the scope of the invention.

The present invention provides a toilet ventilation system configured for use with a specially configured flush toilet 10, shown in FIGs. 1 and 2. While the toilet shown includes a tank portion 12, and a toilet bowl portion 14, disposed below the tank portion, it will be apparent that the invention can be used with tankless toilets – i.e. those using a pressurized flush valve, such as are found in most public restrooms today. The toilet bowl includes a perimeter wall 16 enclosing an interior region 18 of the bowl. Extending through the perimeter wall from the interior of the bowl to the exterior of the bowl is a bowl vent inlet 20. As depicted in FIG. 1, the bowl vent inlet may be disposed near the rear of the toilet bowl. It will be apparent, however, that the bowl vent inlet could be positioned in many locations.

The bowl vent inlet 20 is connected to an air vent pipe, indicated generally at 22, which extends into a wall 24 of the building 26 that houses the toilet, and extends to an outlet 28 outside the building. An electric fan 30 is provided to draw air from the interior 18 of the toilet bowl through the air vent pipe, and to discharge the air through the vent pipe outlet 28. A variety of types of fans could be used, such as axial flow fans, centrifugal fans, etc. A conventional bathroom ceiling fan could also be configured for use in the invention, with the appropriate conduit and fittings. The inventor has found that a fan having a flow rate of 50 cfm (cubic feet per minute) is suitable for this invention.

The system can be configured in a number of ways, as depicted in FIGs. 2-4. In the embodiment of FIG. 2, the vent pipe 22 extends directly to the outside of the building 26, with the fan 30 disposed in-line with the vent pipe. An electric switch 32 is positioned near the toilet and operatively coupled to the fan to allow a user to activate the fan. This switch may be a simple toggle switch, as shown in FIG. 2, or it may be a timer switch 34, as shown in FIG. 3, or any other suitable electric switch.

In the embodiment of FIG. 3, the toilet ventilation system is combined with a room ventilation system. In this embodiment, the vent pipe 22 extends into the attic 36 of the building 26, where it meets a room vent conduit 38 extending upward from the ceiling of the room housing the toilet. Air from both the vent pipe and the room vent conduit are drawn through the fan 30a, and discharged out of the building through the vent pipe outlet 28a. The embodiment of FIG. 4 is similar to that of FIG. 3, except that the room vent conduit 38a

extends from a room vent fan 40. The timer switch 34a controls both the fan 30a and the room vent fan 40.

In another embodiment, shown in FIG. 5, the vent pipe 22 is connected to a sewer vent pipe 42 having an outlet 28b. This sewer vent pipe may be a sewer vent pipe associated with the toilet 10, or may be another sewer vent pipe in the building 26. Such sewer vents are well known, and are generally associated with sewer drains of all kinds. With respect to the sewer vent pipe, the representation of FIG. 5 is partially schematic in nature. The position of this pipe is not necessarily as shown. The fan 30b is disposed in the line of the vent pipe, and pumps air drawn from the interior 18 of the toilet bowl into the sewer vent for discharge outside, as controlled by the switch 32a. This embodiment may also include a one-way valve 44 which prevents sewer odors from entering the vent pipe when the fan is not activated.

Cross-sectional views of two alternative configurations of the toilet bowl wall 16 and the bowl vent inlet 20 are shown in FIGs. 6a and 6b. In one embodiment, shown in FIG. 6a, the vent inlet 20a is integrally formed as part of the toilet bowl wall 16. Toilets are typically formed of ceramic material, and in this embodiment, the vent inlet is integrally formed of the ceramic material of the toilet bowl. In another embodiment, shown in FIG. 6b, the bowl vent inlet 20b comprises an insert that is a separate piece of conduit 46 that extends through an aperture 48 in the perimeter wall. Sealant 50 and an external cover plate 52 may be used to provide a water tight seal between the conduit and the toilet bowl wall, and to provide a neat appearance on the outside.

The embodiment of FIG. 6b could be configured in many ways. For example, the toilet 10 is typically formed of ceramic material, with the aperture 48 formed in the ceramic material. The conduit 46 that goes into the aperture could be formed of a variety of materials. For example, it could be a short section of polymer tubing, such as ABS, PVC, etc., which is inserted into the aperture and anchored and sealed in place. Alternatively, the conduit could be a separate section of ceramic conduit (i.e. of the same material as the toilet) that is inserted into the aperture and anchored and sealed into place.

The alternative configurations shown in FIGs. 6a and 6b demonstrate that there are different methods whereby this type of toilet ventilation system may be installed. For example, the embodiment of FIG. 6a relates to a specially configured toilet that is manufactured with the bowl vent inlet 20 integrally formed in the toilet bowl wall 16. However, the embodiment of FIG. 6b could either represent a toilet as-manufactured, or could be a retrofit system. For example, an existing toilet could be retrofitted for a ventilation system according to the invention by having the aperture 48 drilled or otherwise

formed in the toilet bowl wall, and the vent inlet conduit 46 placed through the aperture. The vent inlet could then be connected to the vent pipe 22 in any of the various embodiments disclosed herein. Alternatively, the aperture could be formed during manufacture of the toilet, with the vent inlet conduit anchored and sealed in the aperture also at the time of manufacture.

5 The bowl vent inlet 20 also includes an exterior end 54 that is configured to connect to the vent pipe 22 (FIG. 1). As shown in FIG. 6b, the exterior end of the inlet conduit may include an annular retaining rib 56, configured to help hold and seal the end of the inlet to the vent pipe when connected. To accommodate any slight misalignment of the toilet bowl inlet 10 20 and the vent pipe 22, a section of flexible conduit 58 may be provided to connect them, as shown in FIGs. 1-5. This simplifies the installation of the system, particularly where the toilet ventilation system is retrofitted to an existing toilet in an existing building.

15 The end of the vent inlet 20 within the interior 18 of the toilet bowl includes a turned-down end 60, which helps to resist the entrance of water into the bowl vent inlet. As shown in FIGs. 6a and 6b, the turned-down end can comprise an integral end of the vent inlet. Alternatively, the vent conduit could be substantially straight, with the turned-down end comprising an elbow that is attached to the end of the vent inlet in the interior of the toilet bowl.

20 Viewing FIGs. 1, 6a, and 6b, within the toilet bowl is a static water level 62. This represents the natural level of the water in the toilet bowl when not in use. The preferred location of the vent inlet 20 is below the rim 64 of the toilet bowl, and above the static water level. More preferably, the inlet is disposed above the flush high water level 66, which represents the level to which the water will normally rise when the toilet is flushed. These elevations help prevent water from entering the vent inlet during normal use of the toilet. It is 25 also desirable to orient the portion of the vent pipe 22 that extends from the toilet bowl wall to the building wall at a slight downward angle, as shown in FIGs. 2-5, so that any water that does happen to enter the vent pipe (such as if the toilet becomes backed-up) will naturally drain out when the vent inlet is clear.

30 The invention thus presents a specially-configured toilet and a toilet ventilation system for removing odors from the bowl of the toilet. The system includes a vent pipe that extends through the wall of the toilet bowl and has an inlet therein, and a fan in the line of the vent pipe to draw air therethrough to discharge toilet odors through an outlet outside the building where the toilet is located. The vent fan may be a separate fan solely for the toilet

ventilation system, or it may be associated with a system that also ventilates the bathroom as a whole.

It is to be understood that the above-referenced arrangements are illustrative of the application for the principles of the present invention. Numerous modifications and 5 alternative arrangements can be devised without departing from the spirit and scope of the present invention while the present invention has been shown in the drawings and described above in connection with the exemplary embodiment(s) of the invention. It will be apparent to those of ordinary skill in the art that numerous modifications can be made without departing from the principles and concepts of the invention as set forth in the claims.